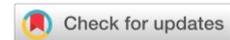


# Effectiveness of Peppermint Aromatherapy to Reduce Nausea and Vomiting in Pregnant Women in The First Trimester

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## ABSTRACT

**Background:** Emesis gravidarum is a condition of severe nausea and vomiting in pregnant women in the first trimester that can cause serious complications such as dehydration and nutritional disorders. At the Jatibaru Health Center, Subang Regency, complaints of nausea and vomiting in the first trimester have increased, but effective non-pharmacological treatment is still limited. Peppermint aromatherapy, with its antiemetic menthol content, has been widely researched as a safe and effective therapeutic alternative to reduce these symptoms. This study aimed to evaluate the effectiveness of peppermint aromatherapy in reducing the rate of nausea and vomiting in pregnant women in the first trimester.

**Methods:** The study used a quasi-experimental design with a pretest-posttest group control approach. A sample of 54 first-trimester pregnant women was divided into a treatment group (n=27) that received peppermint aromatherapy twice daily for seven days, and a control group (n=27) without intervention. Data were collected using the PUQE (Pregnancy Unique Quantification of Emesis) Score and analyzed univariate and bivariate using Wilcoxon and Mann-Whitney tests.

**Results:** The average PUQE score of the treatment group decreased significantly from 10.56 (SD=1.188) to 5.33 (SD=1.038) after the intervention (p=0.000). The control group also experienced a decrease in score from 11.04 (SD=0.759) to 9.96 (SD=0.808) (p=0.000), but this decrease was smaller than that of the treatment group. Intergroup analysis showed a significant difference in the decrease in PUQE score (p=0.000), proving the effectiveness of peppermint aromatherapy in reducing symptoms of emesis gravidarum.

**Conclusion:** Peppermint aromatherapy is effective in significantly reducing the rate of nausea and vomiting in pregnant women in the first trimester at the Jatibaru Health Center, Subang Regency. This therapy can be a safe and practical non-pharmacological alternative to improve the comfort of pregnant women.

## I. Introduction

Pregnancy is a physiological process that brings major changes to a woman's body, both hormonally, emotionally, and metabolically. In the first trimester, these changes often cause clinical complaints, one of which is emesis gravidarum, which is a severe form of nausea and vomiting that can disrupt the balance of fluids and electrolytes of the mother's body. Unlike mild nausea and vomiting which is common and can be treated independently, emesis gravidarum is pathological and has the potential to cause serious complications such as severe dehydration, weight loss, impaired nutritional intake, to electrolyte imbalances that require immediate medical intervention (Gadsby, Barnie-Adshead, & Jagger, 2020).

Globally, the prevalence of emesis gravidarum ranges from 0.3% to 3.6% of all pregnancies, with an average incidence rate of about 1.1%. This condition is one of the main causes of hospitalization in pregnant women in the first trimester in various countries because the symptoms are quite severe and have an impact on daily activities (Gadsby *et al.*, 2020). Although its prevalence is lower than nausea and vomiting of pregnancy (NVP) which occurs in more than 70% of pregnancies, emesis gravidarum has a much more significant clinical impact, both on maternal health and fetal development. In Indonesia, although national data related to emesis gravidarum is still limited, there are several reports that state that its prevalence is in the range of 1% to 3% of all pregnancies (World Health Organization [WHO], 2019; Ministry of Health of the Republic of Indonesia [Kemenkes RI], 2022). Data from Riskesdas (2018) noted that around 20.1% of pregnant women experienced complaints of nausea and vomiting, although not all of them were severe. The 2018 Indonesian Demographic and Health Survey (SDKI) report also shows an increasing trend of complaints of nausea and vomiting in pregnancy which needs to be a concern in antenatal service programs.

At the West Java provincial level, around 13% of pregnant women reported complaints of nausea and vomiting, with 2–3% of them classified as emesis gravidarum that required further medical treatment (West Java Provincial Health Office, 2021). In Subang Regency, complaints of nausea and vomiting in pregnant women in the first trimester remain one of the main reasons for antenatal visits, with a prevalence of around 20%–25%.

Jatibaru Health Center medical record data shows that by 2024, as many as 83 out of 321 pregnant women in the first trimester (25.8%) will experience moderate to severe nausea and vomiting, with 33 mothers (40%) having received treatment in the form of education and vitamin B6 administration, while 50 mothers (60%) have not received structured interventions. By 2025, the number of cases will increase to 97 out of 350 pregnant women (27.7%), of which 39 mothers (40%) have received treatment, while the other 58 mothers (60%) have still not been treated optimally. This condition shows that the symptoms of nausea and vomiting in pregnant women remain a significant problem that needs special attention in antenatal services.

Treatment of emesis gravidarum is generally carried out through pharmacological therapies such as antihistamines, vitamin B6, or methopramides. However, some pregnant women are reluctant to use these drugs due to concerns about side effects on the fetus, especially in early pregnancy. Therefore, the need for non-pharmacological alternatives that are safe, effective, and easy to apply is increasing. One of the methods that has been widely researched is peppermint aromatherapy, which contains menthol and menthone compounds that are antiemetic and soothe the digestive system (Alisa, 2024). The implementation of peppermint aromatherapy at the Jatibaru Health Center has the potential to be an intervention strategy that can close the treatment gap, especially for pregnant women who have not received structured therapy.

Strengthening evidence-based complementary therapy approaches has also begun to be applied in midwifery services in first-level health facilities, including health centers. The study conducted by Abbaspoor *et al.* (2018) showed that inhalation of peppermint aromatherapy can significantly lower nausea and vomiting scores in pregnant women in the first trimester compared to the control group. Research by Joulærad *et al.* (2019) also showed that the administration of peppermint aromatherapy for five days resulted in a significant reduction in nausea symptoms without causing significant side effects. These results strengthen the potential for the application of peppermint aromatherapy as part of applicable non-pharmacological interventions in health centers, especially to improve the comfort and quality of life of pregnant women holistically.

Other studies also support peppermint's effectiveness in reducing symptoms of emesis gravidarum. Alisa (2024) reported a significant decrease in vomiting frequency after five days of peppermint inhalation. Ulya, Astuti, and Lestari (2024) showed that the combination of peppermint aromatherapy and P6 point acupressure was able to accelerate symptom improvement compared to a single intervention. Rahmah (2024) noted that more than 80% of respondents experienced improvement from the heavy to medium or light category after undergoing peppermint aromatherapy interventions.

Based on the conditions that have been described, this study was directed to assess the effectiveness of peppermint aromatherapy in reducing symptoms of emesis gravidarum in pregnant women in the first trimester at the Jatibaru Health Center, Subang Regency. This research aims to provide scientific evidence that can be used as a basis for the application of safe, effective, and evidence-based complementary interventions in primary health services, while contributing to improving the overall quality of antenatal services (Frilasari *et al.*, 2024).

## METHODS

The types of research used were quasy-experiment, pre and post-test with control group. The population in this study is 62 pregnant women in the 1st trimester in the working area of the Mekarwangi Health Center. The sampling technique used purposive sampling, with calculation using the slovin formula to obtain a sample of 54 people. This research was carried out at the Jatibaru Health Center, Subang Regency. This research instrument uses PUQE Score-24. Data analysis used the Wilcoxon Signed Rank Test for group analysis, and the Mann-Whitney U Test for intergroup analysis because the data were not normally distributed from the normality test results using the Shapiro-Wilk test.

## RESULTS

### Nausea and vomiting levels before and after in the treatment group

Table 1. Average Rate of Nausea and Vomiting Before Intervention in the Group

Variabel	N	Minimum	Maximum	Mean	Standard Deviation
Pretest Treatment Group	27	9	12	10,56	1,188
Posttest Treatment Group	27	3	7	5,33	1,038

Based on Table 1, it shows that the average score of emesis gravidarum based on the PUQE score before the administration of peppermint aromatherapy in the treatment group was 10.56 with a standard deviation of 1.188, the lowest score of 9 and the highest score of 12. After being given peppermint aromatherapy for seven consecutive days, the average score decreased to 5.33 with a standard deviation of 1.038, a lowest score of 3 and a highest score of 7. These findings show a significant decrease in the emesis gravidarum score in the treatment group after the intervention.

### Nausea and vomiting levels before and after in the control group

Table 2. Average Rate of Nausea and Vomiting After Intervention in the Control Group

Pregnant Women's Knowledge about SEZs	Frequency (f)	Percentage (%)
Less	0	0,0
Good	25	100
Sum	25	100

Based on Table 2, the average emesis gravidarum score in the control group before the intervention was 11.04 with a standard deviation of 0.759, the lowest score was 10 and the highest score was 12. After a period of observation without the administration of peppermint aromatherapy, the average score decreased to 9.96 with a standard deviation of 0.808, the lowest score of 9 and the highest score of 11.

### Effect of Peppermint Aromatherapy on Reducing Nausea and Vomiting Score (PUQE) in Pregnant Women in the First Trimester

Table 3. Effect of Peppermint Aromatherapy on Reducing Nausea and Vomiting Score (PUQE) in Pregnant Women in the First Trimester

Group	N	Mean Rank	Sum of Ranks	P Value
Treatment	27	14,00	378,00	0.000
Control	27	41,00	1107,00	

The results of the Mann-Whitney test showed a significance value of  $p < 0.001$ , indicating a significant difference between the treatment and control groups. The group given the peppermint aromatherapy intervention showed a more significant reduction in nausea and vomiting scores than the control group.

## DISCUSSION

### Univariate Analysis

#### Nausea and vomiting levels before and after in the treatment group

The results of the study in the treatment group showed that the average PUQE score before the peppermint aromatherapy intervention was 10.56 (SD = 1.188) with a minimum score of 9 and a maximum of 12, while after the intervention the average score decreased to 5.33 (SD = 1.038) with a minimum score of 3 and a maximum of 7. Bivariate analysis using the Wilcoxon test showed a significant difference between pretest and posttest scores ( $Z = -4.574$ ;  $p = 0.000$ ), which means that consistently administering peppermint aromatherapy twice daily for seven consecutive days was effective in lowering the rate of nausea and vomiting in first-trimester pregnant women. This decrease in score is not only statistically significant, but also has clinical relevance due to the considerable difference in average, thus suggesting a positive impact of the intervention on the symptoms of emesis gravidarum.

These findings are in line with the results of research conducted by [Sutiani \*et al.\* \(2020\)](#) which reported that the administration of peppermint aromatherapy in pregnant women in the first trimester could significantly reduce the frequency and intensity of nausea and vomiting after seven days of use. Similar results were also reported by [Keshavarz \*et al.\* \(2018\)](#) in Iran, where inhalation of peppermint oil for five days was shown to significantly lower nausea and vomiting scores compared to a control group that received only standard treatment. Another study by [Pertiwi and Lestari \(2021\)](#) in Indonesia also corroborates these findings, with the result that peppermint aromatherapy provides a relaxation and central nervous system stimulating effect that contributes to the reduction of symptoms of emesis gravidarum. The consistency of the results of these studies provides a strong empirical basis that peppermint aromatherapy is an effective non-pharmacological method to overcome nausea and vomiting in pregnant women.

In theory, the mechanism of action of peppermint aromatherapy in reducing nausea and vomiting is explained through the main content of menthol and menthone which have a calming effect on the smooth muscles of the digestive tract and modulate the response of the nausea center in the medulla oblongata. When peppermint scent molecules are inhaled, the volatile compound stimulates olfactory receptors which then send signals to the brain's limbic system, specifically to the hypothalamus and amygdala, which play a role in the regulation of emotions and physiological responses to nausea. In addition, menthol has an *antispasmodic* effect that can reduce excessive gastric muscle contractions, thus helping to reduce the sensation of nausea. This theory is supported by explanations from [Safajou \*et al\* \(2016\)](#) who state that peppermint oil has pharmacological properties as a carmitive, mild analgesic, and antiemetic. Thus, the resulting therapeutic effect is not only sensory through scent, but also physiological through the action of its active compounds.

Based on the findings of this study, the researchers assumed that the significant decrease in the rate of nausea and vomiting in the treatment group was influenced by the combination of physiological and psychological effects of peppermint aromatherapy. The physiological effect comes from the pharmacological mechanism of menthol compounds that act on the digestive system and the nausea center in the brain, while the psychological effect arises from the sense of comfort and relaxation that pregnant women feel during inhalation, thereby reducing stress that can worsen the symptoms of nausea and vomiting. In addition, discipline in the implementation of interventions twice a day for seven days is also an important factor that maximizes the benefits of aromatherapy. The researchers also assumed that the calm environment of the intervention implementation and family support also reinforced the positive effects of this therapy. This suggests that the success of the intervention depends not only on the nature of the aromatherapy ingredients, but also on the consistency of application and the accompanying external supporting factors.

#### Nausea and vomiting levels before and after in the control group

The results of the study in the control group showed that the average PUQE score before observation without intervention was 11.04 (SD = 0.759) with a minimum score of 10 and a maximum of 12, while after the observation period the average score decreased to 9.96 (SD = 0.808) with a minimum score of 9 and a maximum of 11. Bivariate analysis using the Wilcoxon test showed a significant difference between pretest and posttest scores ( $Z = -5.038$ ;  $p = 0.000$ ), which means that even without the intervention of peppermint aromatherapy, there was a decrease in the rate of nausea and vomiting in most respondents. This decrease tended to be smaller than in the treatment group, indicating

that natural factors or other external conditions played a role in the improvement of emesis gravidarum symptoms in this group.

These findings are in line with the research of Fitriana *et al.* (2019) which found that in some pregnant women in the first trimester, symptoms of nausea and vomiting can decrease naturally as the body adapts to hormonal changes, even without special intervention. Similar results were also reported by Smith *et al.* (2017) in Australia, which noted a decrease in nausea and vomiting scores in the control group in aromatherapy studies, although the decline was smaller and not as rapid as the intervention group. Research by Rukmini and Sari (2021) in Indonesia also showed a mild improvement in nausea and vomiting symptoms in the control group, which was most likely influenced by physiological adaptation factors as well as psychosocial support during pregnancy.

In theory, the decrease in the rate of nausea and vomiting in the control group can be explained by the physiological adaptation process of the pregnant woman's body to the increase in pregnancy hormones, especially human chorionic gonadotropin (hCG) and estrogen, which at the beginning of pregnancy play a role in triggering the sensation of nausea and vomiting (Annals of Medicine and Surgery, 2025). According to the theory of homeostasis, the body will try to adjust to these hormonal changes so that the symptoms of nausea and vomiting can decrease over time. In addition, psychological factors such as reduced anxiety as pregnancy progresses, family support, and an adjusted diet can also help relieve symptoms even without specific therapy.

Based on the findings of this study, researchers assume that the decrease in nausea and vomiting score in the control group is due to natural factors in the form of the body's adaptation to hormonal changes that occur in the first trimester of pregnancy. The researchers also estimated that respondents in the control group received support from their families and the surrounding environment which helped reduce stress, thereby indirectly improving the symptoms of nausea and vomiting. However, since the decline was not as large as in the treatment group, it can be assumed that natural and psychosocial factors alone are not enough to provide a clinically significant reduction in a short period of time, so additional interventions such as peppermint aromatherapy may be a more effective option.

### **Bivariate**

The results of the Mann-Whitney test in this study showed a significant difference between the treatment group and the control group in reducing the PUQE score ( $p = 0.000$ ;  $p < 0.05$ ). The Mean Rank value in the treatment group (14.00) was lower than in the control group (41.00), which suggests that peppermint aromatherapy intervention was more effective in reducing the rate of nausea and vomiting in pregnant women in the first trimester compared to not given a similar intervention. This difference reinforces previous findings in intragroup analyses, where the treatment group experienced a significant decrease in PUQE scores after the intervention, while the control group showed a decrease that was not as large as the treatment group.

These findings are in line with research by Darmawan *et al.* (2022) which reported that the use of peppermint aromatherapy was able to significantly reduce nausea and vomiting complaints in pregnant women compared to the group that only received standard treatment. Similar results were also obtained by Khalili *et al.* (2020) in an RCT study in Iran, which found that inhalation of peppermint for 7 days was able to reduce the frequency and intensity of nausea and vomiting more effectively than the control group. Research by Mayasari and Putri (2021) in Indonesia also confirmed that peppermint aromatherapy provides a relaxation effect, increases comfort, and reduces vomiting stimuli in early trimester pregnant women.

Physiologically, the effectiveness of peppermint aromatherapy is explained by the content of menthol which is carminative and antispasmodic, so that it is able to reduce the contraction of the smooth muscles of the gastrointestinal tract and relieve nausea (National Center for Complementary and Integrative Health, 2021). This mechanism is also supported by a stimulating effect on olfactory receptors that send signals to the limbic system, specifically the hypothalamus, which plays a role in regulating emotions and the body's response to discomfort. This response can reduce the sensation of nausea through modulation of neurotransmitters and a decrease in the activity of the vomiting center in the *medulla oblongata*.

Based on these results, the researchers assume that the significant differences found are not only due to the pharmacological effects of peppermint, but also to psychological factors that arise due to pregnant women's belief in the benefits of the intervention provided (positive placebo effect) (Keshavarz, et al. 2018). In addition, the support and attention provided during the intervention process may

contribute to increased respondent comfort, resulting in significantly reduced symptoms of nausea and vomiting in the treatment group. Researchers also estimate that variation in response between individuals may be influenced by hormonal conditions, olfactory sensitivity, as well as experience of nausea and vomiting in previous pregnancies.

It can be concluded that the administration of peppermint aromatherapy is significantly more effective in reducing the rate of nausea and vomiting in pregnant women in the first trimester than without intervention. These results provide practical implications that aromatherapy-based nonpharmacological interventions may be an alternative to standard care for pregnant women who experience nausea and vomiting.

## CONCLUSION

Based on the results of data analysis and research findings that have been carried out at the Jatibaru Health Center, it can be concluded that: The rate of nausea and vomiting in the treatment group decreased on average from 10.56 in the pretest to 5.33 in the posttest. This showed significant improvement after peppermint aromatherapy intervention ( $p < 0.05$ ). The level of nausea and vomiting in the control group decreased on average from 11.04 in the pretest to 9.96 in the posttest with a significant but smaller decrease compared to the treatment group ( $p < 0.05$ ). There was a significant difference in the rate of nausea and vomiting between the treatment group and the control group after the intervention, where the treatment group had a greater mean decrease ( $p < 0.05$ ).

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## CONFLICTS OF INTEREST

No conflict of interest was found during the research

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